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## PRODUCTION AND IMPORTS OF THE YUGOSLAV MEDICAL INDUSTRY

The following report is taken from Informativni prirucnik o Jugoslaviji (Information Handbook on Yugoslavia), which has been published in sections since late 1948 by the Yugoslav Directorate for Information.<sup>7</sup>

## Chemical and Pharmaceutical Production

Prior to the liberation, Yugoslavia's domestic medical industry was quite undeveloped, consisting of compounding imported pharmaceutical raw materials in a few laboratories and small enterprises, such as the "Ifa" in Zagreb, the "Kastel" in Zagreb, and various German and French firms, which repacked finished medicines in smaller packages.

The volume of production was very low. The value of imports of medicine totaled about 300 million dinars, while that of domestic production totaled about 30 million dinars.

Ordinary people did not have the means to buy medicines, so that only limited sections of the population were supplied with them.

Drug cartels had a monopoly on the market, with the result that a large number of so-called "special medicines" flooded the country, although a large number of them were of questionable value.

After the liberation, existing enterprises and laboratories were nationalized and merged into four enterprises: the "Alkaloid" Factory (Fabrika alkaloida "Alkaloid"), the "Pliva" Medicine Factory (Fabrika lekova "Pliva") [organized from the former "Ifa," "Kastel," and "Plibah" enterprises], the "Lek" Medicine Factory (Fabrika zdravila "Lek"), and the "Plonir" Factory for Dietetic Preparations (Fabrika dijetalnih preparata "Plonir"). Four new enterprises were organized: the "Galenika" Pharmaceutical and Chemical Products Factory (Fabrika farmaceutsko-hemiskih proizvoda "Galenika"), the "Prolek" Medicine Factory (Fabrika lekova "Prolek"), the "Sutjeska" Surgical and Medical Instrument Factory (Fabrika hirurisko-medicinskih instrumenata "Sutjeska"), and the "Jugodent" Dentists' Instrument Equipment Factory (Fabrika zubotehnickih instrumenata i uredjaja "Jugodent").

- 1 -

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The Five-Year Plan calls for the medical industry to produce medicines for the control of diseases such as malaria, tuberculosis, and syphilis, and to develop production to meet demand, and make effective and inexpensive treatment possible.

A large number of medicines are produced from animal organs which had previously been considered waste and which were formerly utilized very little in Yugoslavia. At present, waste products of slaughter houses (endocrine glands and other organs and their products) are used for the production of a large number of important medical preparations such as insulin, liver extract, pepsin, peptone, cholesterol, thyroid, estrone, and others.

It is the responsibility of the "Prolek" Factory to process such waste products, in addition to producing organic therapeutic preparations.

The "Alkaloid" Factory (Skoplje) is engaged in producing alkaloids from opium, such as morphine, codeine, papaverine, and thebaine and processing these alkaloids into various derivatives such as ethylmorphine hydrochloride (dionin), diacetylmorphine (heroin), methylmorphine (codeine), and the like.

The "Lek" Factory (Ljubljana) produces glycosides and alkaloids from domestic medicinal plants which are not included in the production program of the "Alkaloid" Factory, such as atropine, pilocarpine, glycosides of Digitalis Lanata, and the like. This factory also produces inorganic compounds used as medicines, such as mercury and bismuth salts. It produces various extracts, ether, and a large number of finished medicines.

The completion of the "Pliva" Factory (Zagreb) will increase considerably the production of pharmaceutical raw materials required by the Yugoslav medical industry. The "Pliva" Factory also produces serums, vaccines, pharmaceutical inorganic salts, reagents for tests, pure chemicals, and the like.

In addition to producing finished medicines, the "Galenika" Factory produces materials for dentists such as phosphate and silicate cements, various waxes, and the like. The "Galenika" Factory has begun to produce penicillin, amidopyrine, phenacetine, and various plasters.

Yugoslav medical production includes the following.

1. Finished medicines: acetylcholine, "Alusil," "Amarum," aminophylline, "Aminoveron," antacidin, "Antiskabin" [skin ointment?], "Apelagrin," "Aplosan," Aricyl, asthmophylline, barbital, belladonine, "Belalunal," bismuthous oxide, serotonin, chloramine, chloroboldine, cinchophenol, "Citrobal" [Citrine balm or ointment?], "Kodacil" [codeine compound?], Congo red, corticosterone, cortin, cyclobarbital, "Cistotropin," "Dihidrohol" [dihydrocholesterol?], "Dermogel," "Dermosan," dermatol, dextrin-maltose, "Dekstrofilin" [derivative of dextrose and chlorophyll?], dimercaptopropanol, ephethiazole, "Epidermin," ergometrine, "Ekspektoral," fluroscein, frangulin, hexaiodine, hypnal, "Infantan," iodine peptone, iodine thional, vitamin K, "Laksulfol," lobeline, "Mentosan" [menthol compound?], methionine, methylthiouracil, "Morhuatin," "Navisan," novalgin, novo-cinchophen, novo-scabrin, "Novospasin" [antispasmodic?], "Optalmid," "Opispasmin" [antispasmodic opium compound?], "Olokain" [cocaine compound for ear treatment?], "Kuabain" [derived from cubeb?], hydroxyphenarsone, hydroxyuracil, pancreatin, penicillin, "Pepsacid" [pepsin and hydrochloric acid?], "Pernidal," "Petantin" [pentalin?], Phenadoxone, "Pilocarpenol," "Plantolaks," Plasmocid, "Prolaksal" [prolactin?], Rheumin, Rutin, "Sanofatal," "Skodifedrin" [pseudoephedrine?], "Spirosept," sulfadiazine, sulfathiazole, "Sulfokutin," Thiophenobarbital, theobromine, "Timotusan," tocopherol, vasotonin, and "Vetagosin."

- 2 -

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2. Pharmaceutical raw materials: ether for anesthesia, ethylmorphine hydrochloride, Alumen Crudum, atropine sulfate, calcium chloride, calcium gluconate, codein phosphate, copper sulfate, Extractum Filicis Maris, "Girodal," hexamethylene-tetramine, magnesium sulfate, morphine hydrochloride, sodium chlorate, sodium citrate, sodium thiosulfate, papaverine hydrochloride, saccharin, vitamin C, sulfosalicylic Acid, benzil benzoate, bromisovaleryl urea, calcium methylarsenate, cyclohexanonoxide, diacetyl-diphenylacetamide, disodium methylarsenate, guanidine nitrate, iodoform, mercurous, pentamethylenetetrazole, sulfacetamide sodium, sulfaguanidine, sulfathiazole, thiocarbamide, bismuthus oxide, calcium formate, sodium formate, potassium iodide, sodium dioxide-azobenzene-methylen-sulfonate, phenylethylcarbonic acid, phenylcinchoninic acid, histidine hydrochloride, and methylthiouracil.

Of finished medicines imported before the war, the following are now produced domestically: "Acevodin," "Acisal," "Adevit," aminopyrine, aneurine, axerophthol, "Belasekal," biheptyl, calciferol, vitamin C, collargol, codeinon, "Kofepirin" [caffeine and antipyrine?], digitalin, digitoxin, "Diuramon," "Etifedrin," "Eulaksin," "Hepatropin," histamine, insulin, "Klimasedon," "Lakomalt" [lactic sugar and malt?], "Lenafolin," "Leptamin," "Mekusal," multivitamin, "Neifrosal" [nephridine compound?], novophenarsone, pantonon, "Pentazol," phenamine, phenobarbital, pituitrin, progesterone, "Sekalin" [drug derived from ergot?], stilbestrol, strophantin, strychnine Arsenate, sulfanilamide, testosterone, thyroid, "Vitacitrol" [vitamin D and citrin?], "Vitaderm," and protamine zinc insulin.

Production and imports of the Yugoslav medical industry (not including the production of surgical medical instruments, dental instruments and equipment or their import) have been as follows:

Year	Index of Production	Imports of Pharmaceu- tical Raw Materials		Imports of Finished Medicines*		Total Medical Industry Imports	
		Million Dinars	Percent of total imports?	(percent of total imports?)		Million Dinars	Percent of Total Imports
1939	100	--	--	--		300.0	790 [sic]
1945	146	--	--	--		--	--
1946	480	19.0	10.4	--		19.0	10.4
1947	980	40.0	10.7	--		--	10.7
1948	1600	145.0	23.8	6.8		197.8	32.0
1949	2250	64.7	7.6	4.7		103.8	12.2
1950	2500	61.4	6.3	3.7		98.0	10.1

\*[The table contained no column for imports of finished medicines in million dinars.]

Among items exported by the Yugoslav medical industry are opium alkaloids, organic therapeutic preparations, serums, vaccines, toxins, various glucosides, salts of bismuth, mercury, and silver, and dental products.

Yugoslav medical industry facilities could satisfy Yugoslav demands for finished medicines, but lack of foreign exchange to pay for the import of pharmaceutical raw materials has prevented full use of facilities. The Yugoslav medical industry will meet only about 80 percent of Yugoslavia's requirements in 1951.

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Production of Surgical, Medical, and Dental Instruments and Equipment

Since medical and dental instruments and equipment were not produced in Yugoslavia before the war, the "Sutjeska" Factory and the "Jugodent" Factory were established.

At the end of 1950, about 400 articles were being produced, including operating tables, basic surgical instruments, plain forceps, scissors, toothed forceps, scalpels, gynecological instruments, eye, ear, nose, and throat instruments, veterinary instruments, all types of autoclaves, thermostats, thermal dryers, and baths. The production of injection syringes and some sharp instruments is included in the production program of the "Sutjeska" Factory, the youngest enterprise of this type in Yugoslavia.

In the "Jugodent" Factory by 1950, about 50 different dentistry items were being produced, such as dentist's chairs, equipment for outpatient dental clinics, apparatus for metal smelting and alloying, and small dental instruments.

The following table shows the development of the production of metals for the medical industry.

	<u>Production (1,000 dinars)</u>	<u>Index</u>
1945	7,708	100
1946	12,707	165
1947	27,192	350
1948	59,680	770
1949	70,115	920
1950	60,640	780

The problem of skilled manpower has been a major problem in expanding and developing the medical industry. Various courses have been given to solve this problem. In 1948, a pharmacy and chemistry course was held, from which 29 skilled blue-collar workers graduated. In 1950, 50 skilled blue-collar workers graduated. A school for 130 trainees in the "Sutjeska" Factory was established in 1947. To date, over 100 skilled blue-collar workers have been trained in this school. All are employed in the factory.

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- 4 -

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